

Remarks

A. Status of the Claims

Upon entry of this Amendment, claims 1-3, 9, 12 and 15-17 are pending. Claims 18-20 have been previously cancelled, claims 1-3, 9, 12 and 15 have been amended, and no new claims have been added. Claims 1-15 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Falster et al. (WO 98/38675) or Huber et al. (U.S. Patent No. 4,851,358), both in view of Aswad (WO 99/03138). Claims 16 and 17 have also been rejected under 35 U.S.C. §103(a) as being unpatentable over Falster et al. or Huber et al., both in view of Aswad.

B. Amendments to the Claims

Claims 1-3, 9, 12 and 15 are amended to clarify the relationship among some components of an apparatus in which the method is performed and to require that the heat treated wafer be cooled at a rate of at least 50°C/sec until the wafer reaches a temperature of less than about 850°C while the wafer is held by the Bernoulli wand. Support for amended claim 1 can be found, for example, at page 11, line 30 through page 12, line 24, page 17, lines 13-16 and at page 18, lines 6-29 of the Specification. No new matter is being added by the amendments to the claims.

C. Rejection Pursuant to 35 U.S.C. 103(a)

Reconsideration is requested of the rejection of claims 1-3, 9, 12 and 15-17 as being unpatentable over Falster et al. or Huber et al., both in view of Aswad.

Claim 1, as amended, is directed to a method of producing a template for oxygen precipitation in an apparatus comprising a treating station, for heating and/or the depositing an epitaxial coating on the wafer, a holding station for both transferring and holding a wafer for cooling and a Bernoulli wand. According to claim 1, as amended, the wafer is heated at the treating station while in immediate heat transfer relation with the support in the treating station, moved out of conductive heat transfer relation with the support using a Bernoulli wand, and cooled from the process temperature at a rate of at least 50 °C/sec until the wafer achieves a temperature of less than 850 °C while the wafer is being held out of conductive heat transfer relationship by the Bernoulli wand.

While Falster et al. and Huber et al. disclose heating wafers to temperatures of at least 1175 °C and even rapidly cooling them, neither reference expressly discloses

moving a wafer with a Bernoulli wand out of heat transfer relation with the support to rapidly cool the wafer while at the same station at which the heat treating was performed.

Aswad discloses a process and apparatus for decreasing the time required to cool a heated wafer which has been subjected to epitaxial deposition. As part of this process, Aswad uses a Bernoulli wand and a cooling station wherein the Bernoulli wand is used to transfer the wafer from the epitaxial deposition station to the cooling station. Significantly, however, Aswad does not pick up the wafer with the Bernoulli wand until the wafer is cooled to a temperature not in excess of 900 °C¹ and Aswad provide no information concerning the amount of time required to cool a wafer from the epitaxial deposition temperature to 900 °C.²

In combination, Falster et al., Huber and Aswad do not suggest the invention defined by claim 1. While Falster et al. disclose that cooling rate is an important consideration in achieving non-uniform vacancy profiles which serve as templates for oxygen precipitation, they do not disclose the means required by claim 1 to achieve a cooling rate of 50 °C/sec. And, while Aswad discloses the use of a Bernoulli wand, Aswad was not concerned with cooling rates at temperatures in excess of 900 °C. Aswad was exclusively concerned with cooling rates at temperatures less than 900 °C. Furthermore, Aswad expressly discloses that to increase the cooling rates, a cooling station should be used **instead of** the Bernoulli wand. In combination, therefore, Falster et al., Huber and Aswad do not suggest using a Bernoulli wand to **increase** the cooling rate from the process temperature to a temperature of less than 850 °C. If anything, Aswad teaches away from the invention as defined by claim 1.

Claims 2-3, 9, 12 and 15-17 depend directly or indirectly from claim 1; therefore, claims 2-3, 9, 12 and 15-17 are patentable over the cited references for the same reasons given for claim 1.


¹ See Aswad at column 7, lines 19-21

² According to Goodwin et al., U.S. Patent No. 5,324,155, about one minute is required to cool a wafer from 1150 °C to 1100 °C in an epitaxial reactor. See Goodwin et al. at column 16, lines 33-38.

CONCLUSION

In view of the foregoing, Applicants respectfully submit that claims 1-17 as amended, which are now pending in this application, satisfy the requirements for patentability. A check in the amount of \$100.00 is enclosed for a one-month extension of time. The Commissioner is hereby authorized to charge any deficiency or overpayment of the required fee to Deposit Account No. 19-1345. Favorable reconsideration and allowance of these claims are therefore respectfully requested.

Respectfully submitted,



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